

CLAIMS

1) A method for treating a natural gas containing H₂S, wherein the following stages are carried out :

5 a) contacting said natural gas with a first solvent comprising amine so as to obtain an H₂S-depleted gas and an H₂S-laden solvent,

15 b) contacting the H₂S-depleted gas obtained in stage a) with a second solvent comprising at least 90 % by weight of amine so as to obtain a water-depleted gas and a water-laden solvent.

2) A method as claimed in claim 1 wherein, in stage a), the first solvent comprises between 20 % and 95 % by weight of amine and wherein, in stage b), the second solvent comprises at least 95 % by weight of amine.

3) A method as claimed in claim 1, wherein the H₂S-laden solvent obtained in stage a) and the water-laden solvent obtained in stage b) are regenerated by a single regeneration circuit.

15 4) A method as claimed in claim 1 wherein, in stage a), said natural gas is contacted with the first solvent comprising amine and water and with the water-laden solvent obtained in stage b), and wherein the following stage is carried out :

20 c) distilling the H₂S-laden solvent obtained in stage a) so as to obtain a first H₂S-laden steam and a regenerated solvent, a first part of said regenerated solvent being recycled to stage a) as first solvent.

5) A method as claimed in claim 4, wherein the following stage is carried out :

10 d) distilling, in the presence of hydrocarbons comprising more than five carbon atoms, a second part of the regenerated solvent obtained in stage c) so as to obtain a second steam and said second solvent, comprising at least 90 % amine, used in stage b).

5 6) A method as claimed in claim 4, wherein the following stage is carried out :

15 d) distilling, at a pressure below the atmospheric pressure, a second part of the regenerated solvent obtained in stage c) so as to obtain a second steam and said second solvent, comprising at least 90 % amine, used in stage b).

7) A method as claimed in claim 1, wherein the following stages are carried out :

10 c) distilling the H₂S-laden solvent obtained in stage a) and the water-laden solvent obtained in stage b) so as to obtain a first H₂S-laden steam and a regenerated solvent, a first part of said regenerated solvent being recycled to stage a) as first solvent,

15 d) distilling, at a pressure below the atmospheric pressure, a second part of the regenerated solvent obtained in stage c) so as to obtain a second steam and said second solvent, comprising at least 90 % amine, used in stage b).

8) A method as claimed in claim 4 wherein, in stage b), said second part forms between 1 % and 50 % by weight of said regenerated solvent obtained in stage c).

10 9) A method as claimed in claim 4 wherein, before stage c), said H₂S-laden solvent obtained in stage a) is expanded in order to release H₂S.

20 10) A method as claimed in claim 6 wherein, in stage c), distillation is carried out in a first distillation column and, in stage d), distillation is carried out in a second distillation column, and wherein the following stages are carried out :

- e) cooling the second steam obtained in stage d) so as to obtain a liquid aqueous phase and a third H₂S-laden steam,
- f) feeding a first part of said aqueous phase obtained in stage e) to the top of the first column and feeding a second part of said liquid obtained in stage e) to the top of 5 the second column.

11) A method as claimed in claim 7 wherein, in stage c), distillation is carried out in a first distillation column and, in stage d), distillation is carried out in a second distillation column, and wherein the following stages are carried out :

- e) cooling the second steam obtained in stage d) so as to obtain a liquid aqueous 10 phase and a third H₂S-laden steam,
- f) feeding a first part of said aqueous phase obtained in stage e) to the top of the first column and feeding a second part of said liquid obtained in stage e) to the top of the second column.

12) A method as claimed in claim 5 wherein, in stage c), distillation is carried out in 15 a first distillation column and, in stage d), distillation is carried out in a second distillation column, and wherein the following stages are carried out :

- e) cooling the second steam obtained in stage d) so as to obtain a liquid aqueous phase, liquid hydrocarbons and a third H₂S-laden steam,
- f) feeding part of said aqueous phase obtained in stage e) to the top of the second 20 column and feeding part of said hydrocarbons obtained in stage e) to the bottom of the second column.

13) A method as claimed in claim 10, wherein the following stage is carried out :

g) drawing the third steam obtained in stage e) by means of a steam ejector so as to obtain a stream containing water and H₂S, said stream being fed into the first column.

14) A method as claimed in claim 10, wherein the following stages are carried out :

- h) cooling the first steam obtained in stage c) so as to obtain a second water-containing liquid and a fourth H₂S-laden steam,
- i) feeding part of the second liquid obtained in stage h) to the top of the first column.

15) A method as claimed in claim 10, wherein the following stage is carried out :

- j) drawing the third steam obtained in stage e) by means of a vacuum pump.

10 16) A method as claimed in any one of claims 1 to 15, wherein the amine is selected from the group comprising methyldiethanolamine and dimethylethanolamine.